SECAP

18TH ROAD SAFETY CONFERENCE

9th March 2026, Chambéry



Fire Incidents Involving Heavy Goods Vehicles Transporting Electric Bicycles

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Aegean Motorway S.A.

Hosted by ASFA AUTOROUTES & OUVRAGES CONCÉDÉS

The Greek Motorway Network



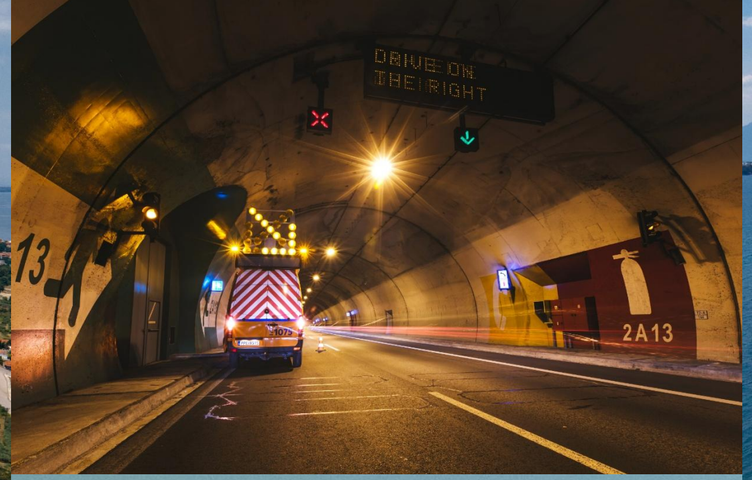
- 234km
- 4 Twin Tunnels - 23.4km long
- 33 I/Cs
- 35 parking areas
- 5 MSS per direction
- 2 SSTPAs
- 5 FTPs
- 21 RTPs

AEGEAN MOTORWAY

MEMO

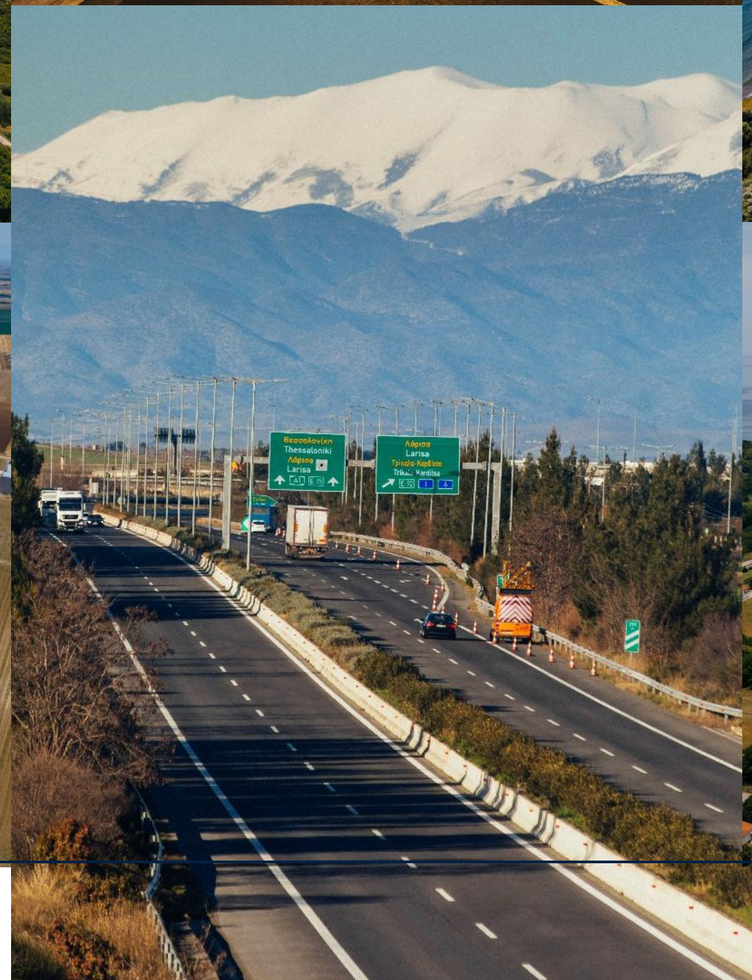
- Motorway
- Tunnel
- Front Toll Plaza
- MSS Motorists Service Station

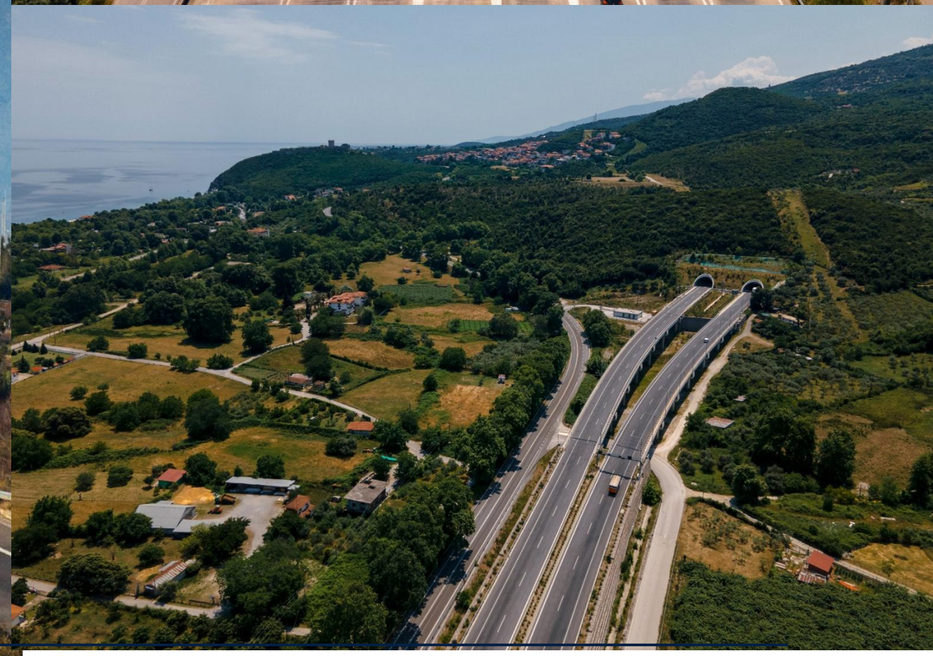



DRIVE ON
THE RIGHT
2A13






Θεσσαλονίκη
Thessaloniki
Λάρισα
Larisa
Λάρισα
Larisa



03.07.2024, 1st Fire Incident Timeline

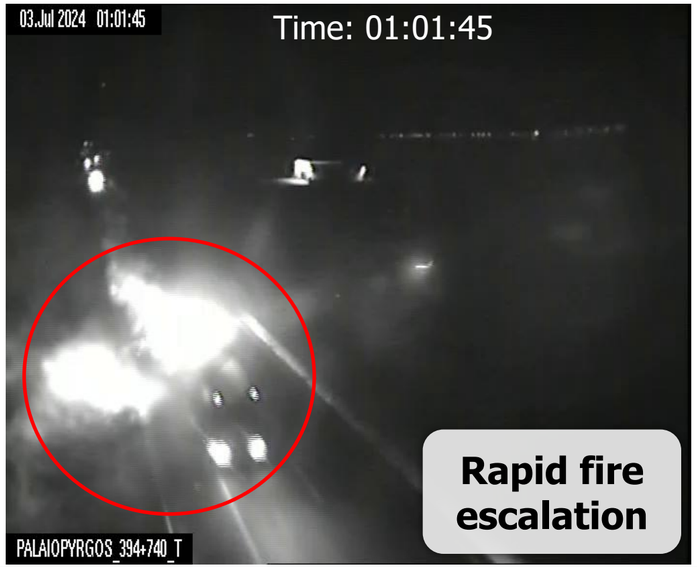
















Within 5’ the semi-trailer was fully engulfed in flames.

Fire Development

Location: (KM) 395+000, direction to Thessaloniki

Time: 01:03

→ **Cargo**: The truck was transporting **electric Bicycles** and **Scooters**.

→ **Immediate Actions**: The Pyrgetos Fire Station, Larissa Fire Brigade and Police emergency units were notified

→ **Emergency Response**: The first fire engines arrived on the spot at **01:06**



Research conducted by IFAB (2022) indicates that a single e-bike battery fire can reach a peak heat release rate of 900 kW to 1.2 MW within 30–60 seconds of ignition.







Traffic Impact and Operational Measures

- ✓ **Traffic closure** at Makrychori **FTP** & Evangelismos **RTP** (Direction to Thessaloniki) **– 39’**
- ✓ **Tunnels T1–T2 closure** via SCADA **– 84’**
- ✓ **Fire under control:** 01:56 **(≈50’)**
- ✓ **Diversion** via **Old National Road** (ONR)
- ✓ **Left lane reopened at 07:11**





Incident Management - Key Operational Challenges



Environmental Management Issues

- Contaminated runoff water
- Battery residues
- Potential soil contamination



H&S Issues

- Toxic smoke
- Risk of re-ignition
- Thermal radiation exposure

Rekindling due to spontaneous batteries ignition

Hazardous Waste Management and Road Safety Restoration

03.07.2024 - Immediate Response

→ Firefighting operations completed
→ Removal of bulk fire-damaged materials
→ Temporary transfer to controlled area (Leptokarya O&M Center)

Objective: Rapid restoration of safe motorway operations.







Licensed Contractor Engagement

POLYECO appointed for hazardous waste management and site remediation.
Affected areas:

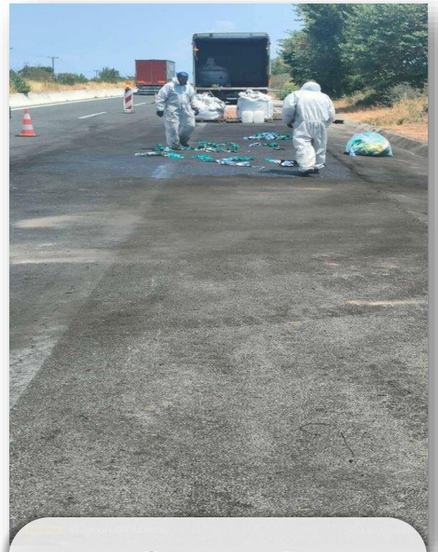
→ Motorway carriageway
→ Temporary storage area (Leptokarya)

05.07.2024 – Sampling & Classification

On-site inspection and sampling conducted. Waste classified under EWC codes:

→ 16 06 02*: Ni–Cd batteries
→ 17 05 03*: Soil and stones containing hazardous substances

Environmental Management Process



Stage 1
Removal of main volume of burnt material

Stage 2
Cleaning of the contaminated surface area





Stage 3
Removal of the contaminated soil near the motorway & Placement in certified big Bags

Stage 4
Temporary storage in licensed facilities.

Pending transfer to authorized final treatment

10.07.2024

Cleaning of contaminated area at the incident's location and management of hazardous waste

- Waste loaded under controlled conditions
- Transported to licensed facilities (Sindos Ind. Area)
- Temporary storage prior to final treatment/disposal

13.07.2024, 2nd Fire Incident, Parking Area KM364+800

A fire broke out in the semi-trailer of a heavy goods vehicle parked at KM 364+800 (direction to Thessaloniki). Time: 01:03

Key Facts

→ The truck was transporting 184 electric bicycles.

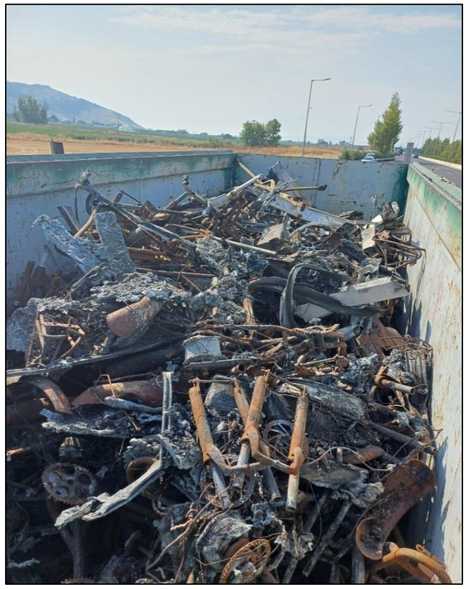
→ The Pyrgetos Fire Station, the Larisa Fire Service and the Larisa Police were immediately notified and responded to the scene.

→ Traffic Police temporarily stopped traffic to allow firefighting operations to be carried out safely.

→ The driver managed to detach the trailer prior to full fire development. The cargo was completely destroyed.

Note!
Hazardous waste produced following motorway incidents (e.g. fire incidents involving trucks loaded with electrical Bicycles and electrical Scooters) had to be managed by specialized contractors.









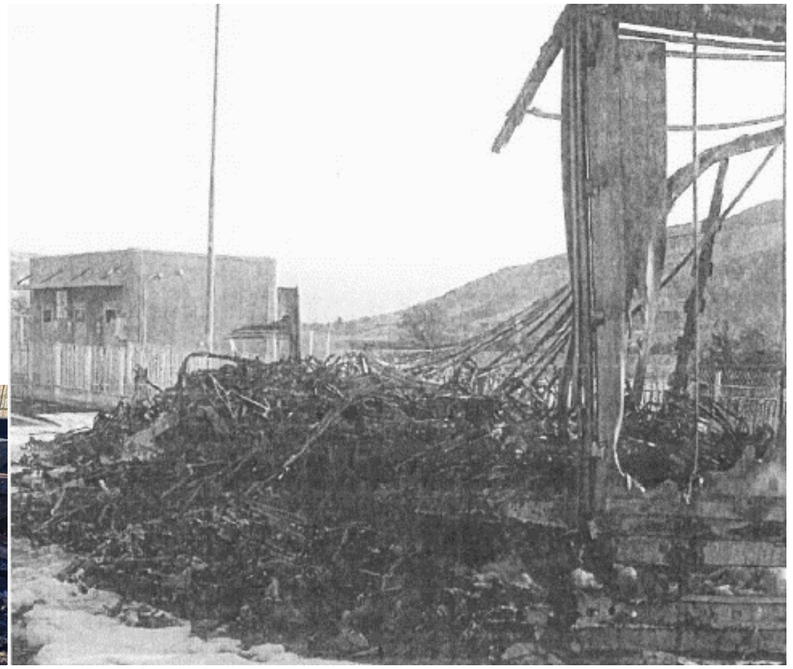
Removal of Waste and other types of Pollutants

Cause of Fire

Cause of Fire – Based on Fire Department Autopsy

- Fire originated in the center of the trailer, among the transported electric bicycles.
- The appointed expert attributed the outbreak to unsafe loading and transportation conditions.
- Immediate cause identified as **ignition of lithium batteries**, combined with:
  a) High ambient temperatures
  b) Moisture development inside the trailer





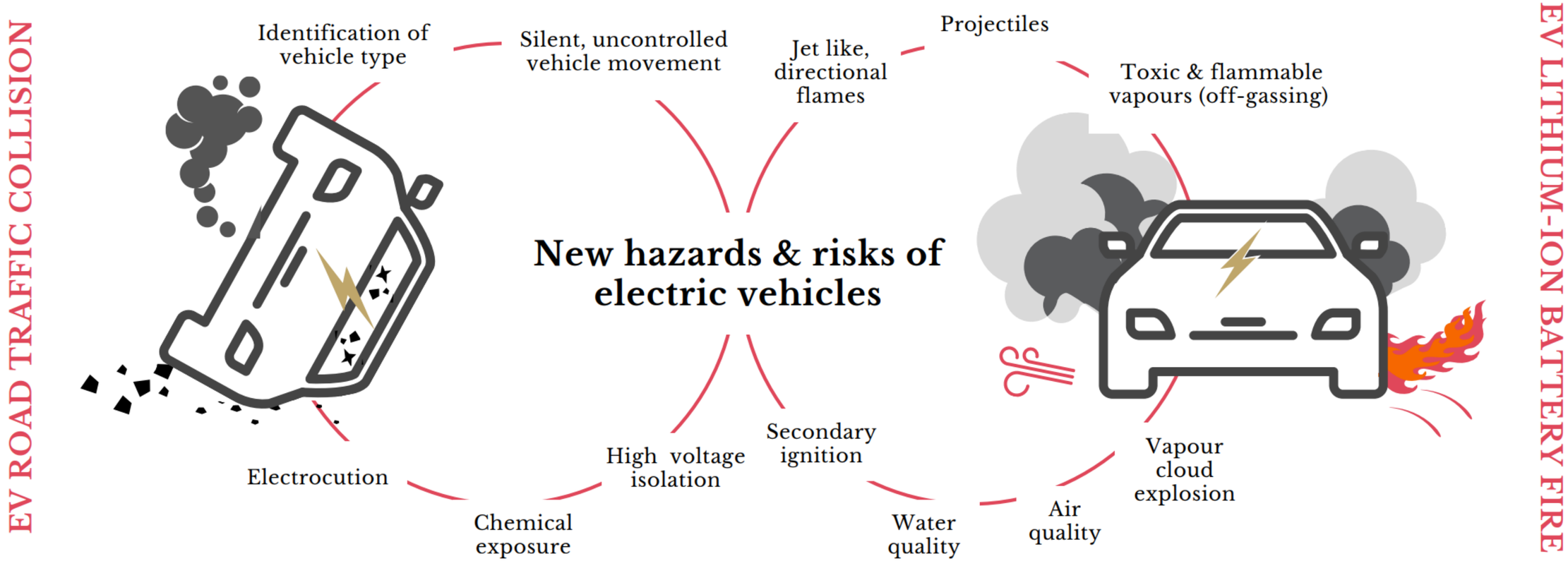
Note!
Flammable Gases + High Temperatures = An Explosive Environment
Leading to:
→ Rapid fire ignition
→ Fire that is difficult to extinguish
→ Release of toxic gases as the fire progresses

Contributing Conditions

During transport, elevated temperatures prevailed, and significant humidity may have accumulated within the enclosed trailer. Under such conditions, lithium battery cells can experience a phenomenon known as **thermal runaway,** where internal overheating leads to the release of flammable gases.

New Risks and Challenges in HV Vehicles

Electric vehicles are generally safe during normal operation and charging. However, following an emergency incident, lithium-ion battery systems introduce new risks and operational challenges for emergency responders and motorway maintenance personnel.



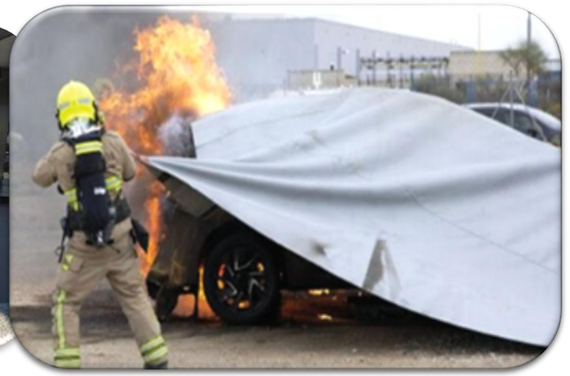
www.evfiresafe.com/

Aegean Motorway's Measures - Emergency Equipment

Innovative Action

For the first time in Greece, Motorway Fire Stations have got emergency equipment for extinguishing EV fire

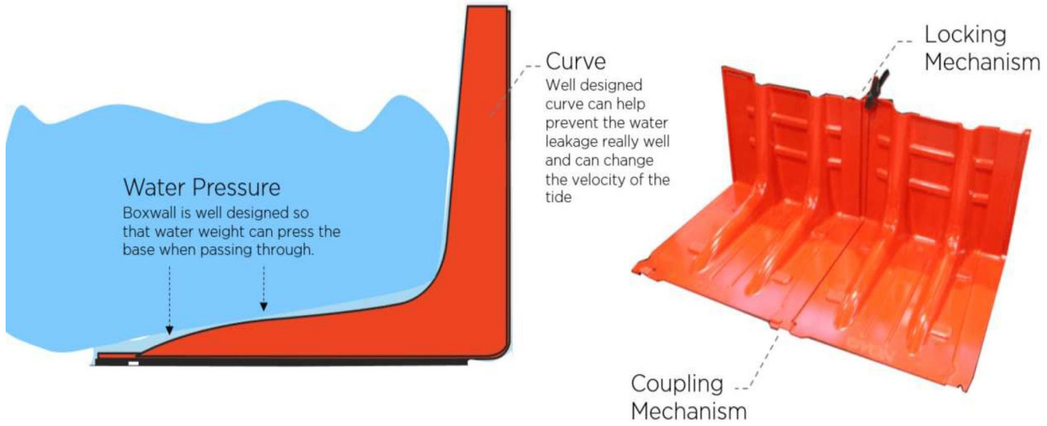

Donation of (3) Fire Blankets (8mx6m)




Donation of (3) Emergency plugs

Innovative Approach

Use of Mobile Flood Barrier systems to enable controlled vehicle water immersion for EV fire management



Mobile Flood Barrier Solution – EV Fire Suppression Concept

1. **Objective:** Rapid containment and cooling of high-voltage batteries to prevent thermal runaway and re-ignition.
   - ✓ Mobile barriers allow **fast deployment of a temporary water containment basin** directly at the incident location.
   - ✓ Enables **safe submersion of damaged EVs**, improving firefighter safety and reducing toxic smoke and prolonged firefighting operations.
   - ✓ Supports modern emergency response strategies addressing **emerging risks from e-mobility incidents**.
2. **Operational benefits:** portable solution, quick installation, adaptable to tunnel and motorway environments, reduced incident duration and traffic disruption.

Aegean Motorway's Measures - Training

High-Voltage Vehicle E-Training successfully delivered

Participants: Concessionaire staff, Roadside Assistance personnel, Police officers.

Objective: Improve safety and operational response to EV incidents.

Topics: High Voltage safety hazards, electrotechnology, battery systems, towing and emergency handling.

Outcome: Enhanced competence and certified knowledge for safe management of electric-vehicle incidents.





Tunnel Emergency Exercise – EV Fire Response Training

Large-scale emergency drill in Tunnel T3 simulating a collision with an electric vehicle battery fire, emphasizing on Fire Service training.

- ✓ Conducted under the approved Common Emergency Response Plan between Authorities and the Concessionaire.
- ✓ Firefighters trained in specialized EV firefighting techniques, including safe intervention procedures and use of dedicated fire blanket equipment.
- ✓ Drill enhanced preparedness of all involved parties and provided hands-on familiarization with tunnel safety systems and emergency equipment.
- ✓ Confirmed effective inter-agency communication, operational coordination, and proper functionality of tunnel safety and traffic management systems.

New Risks and Challenges

Key Risk Factors

1. High energy density lithium batteries.
2. Confined cargo space.
3. Rapid Lithium Battery Ignition.
4. Thermal Runaway.
5. Re-ignition risk.
6. Toxic smoke plume impact in tunnel vicinity.
7. Increased risk for:
   - → *Emergency responders*
   - → *Motorway patrol teams*

Note!

- ✓ The electrification of mobility is transforming road transport.
- ✓ Infrastructure operators must adapt risk management frameworks accordingly.

Emerging framework – New Patterns

- ✓ Growing transport of lithium battery cargo requires updated risk assessment.
- ✓ New freight risk profiles necessitate updated cargo risk classification.
- ✓ Need for:
  - → *Better & more efficient fire detection systems in freight corridors*
  - → *Emergency response protocols for EV cargo*
  - → *Emergency response frameworks to be adapted*
- ✓ Enhanced preparedness levels for tunnel-adjacent incidents are required.
- ✓ Environmental risk management procedures need to be updated.

Action already taken

- ✓ Training of motorway patrol teams.
- ✓ Enhanced Coordination with Fire Brigade for lithium battery fires.
- ✓ Strengthen inter-agency coordination.

Thank you !

Presented by :

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